

Phonocube Installation Manual

Ver: 2014 V1



This installation manual is for the following models:

Phonocube6.6, Phonocube7.2

You should carefully read this manual prior to installing the Phonocube. We recommend that you keep this manual (as well as any other relevant material) in a safe place for future reference.

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Phonocube general information

Dimensions (H x W x D): 1800 x 630 x 550 (mm)

Phonocube cabinet: 100Kg

Battery management system: 10Kg

Battery module: 22Kg per unit

1. IMPORTANT SAFETY GUIDE

This manual contains information regarding the safe installation of the Phonocube, supplied by Phono Solar.

Installers must already be familiar with the mechanical and electrical requirements for the Phonocube. Installers must also read this manual carefully prior to installation. We recommend that you keep this manual in a safe place for future reference.

The Phonocube is not an individual product; it is designed to be connected to PV modules. Installers must have the required specialist skills and knowledge not only for this product, but also for handling PV modules. The Phonocube has a DC input limit for PV modules. The design of the whole system should be approved by Phono Solar or another licensed/qualified person before installation.

1.1 General Safety

- The installation of an Phonocube requires specialized skills and knowledge and must only be carried out by licensed/qualified persons.
- Installers should assume all risks of injury and do everything to avoid potential damages and risks that might occur during installation, including but not limited to, the risks of electric shock.
- Do not remove any attached nameplates or components from the Phonocube.
- When handling the module insulated gloves must be worn.
- Local, regional and state laws and regulations must be adhered to while installing the Phonocube. For example, any necessary licenses must be obtained prior to the installation commencing. Regulations around vehicles and ships must also be observed during the installation.
- Observe all safety rules for the other system components.
- Do not place the Phonocube near a location where flammable gases are either generated or collected.
- Insulated gloves must be worn during the installation.

- Do not wear metal items during the installation.
- Children should be kept away from the Phonocube.
- Only use licensed/qualified insulated tools.

1.2 Storage

In cases where the field installation is not carried out immediately after delivery and acceptance, the Phonocube must be stored as follows:

- Keep the cover intact and in its original condition. The drying agent must be kept in place and should not be abandoned.
- Store the Phonocube with its original packaging in a ventilated, dry and clean indoor environment.
- The storage location should have a flat floor with an adequate loading area for the Phonocube system (still in its original packaging).
- Ensure that there is a consistent environment. The Phonocube should be stored between -10 and +35 , with a relative humidity of 0 to 85%, and where there is no condensation.
- The tilting or stacking of equipment cases is strictly prohibited.

2 MECHANICAL INSTALLATION

(Note: All instructions hereafter are for reference only. A licensed/qualified person or installer must be responsible for the design, installation and security of the Phonocube.)

2.1 Select suitable locations for installation

The Phonocube should be installed in a room, where the floor, space, ventilation and all other safety-precautions are strictly adhered to and meet all requirements listed below:

- The Phonocube must be installed on a flat floor. The foundation must be solid, safe and reliable, with an adequate loading area for the Phonocube system. The horizontal tilt must not exceed 5°.
- The Phonocube must be installed with an adequate distance between the wall and any other equipment. The space at the rear must be greater than 10cm, while the space at the left, right and top must be greater than 20cm to facilitate installation, heat dissipation and maintenance.
- Phonocube must be work on normal environment, the working temperature should not exceed the scope of -5 and +35 .
- The Phonocube must be installed in a well-ventilated environment with high air quality.
- With IP20 protection, the Phonocube can be installed in a dry and clean indoor environment. The installation environment must be free from flammable gas as well as flammable and combustible articles.

2.2 Working on front center cabinet door

Method to disassemble front center cabinet door: unscrew and loosen the four screws on both sides of the cabinet door. Hold the sides of the cabinet door with both hands and take off the center cabinet door in a downward movement, as shown in Fig. 2-1, Fig. 2-2 and Fig. 2-3.



Fig. 2-1 Unscrew and loosen the four screws



Fig. 2-2 Take off the center cabinet door

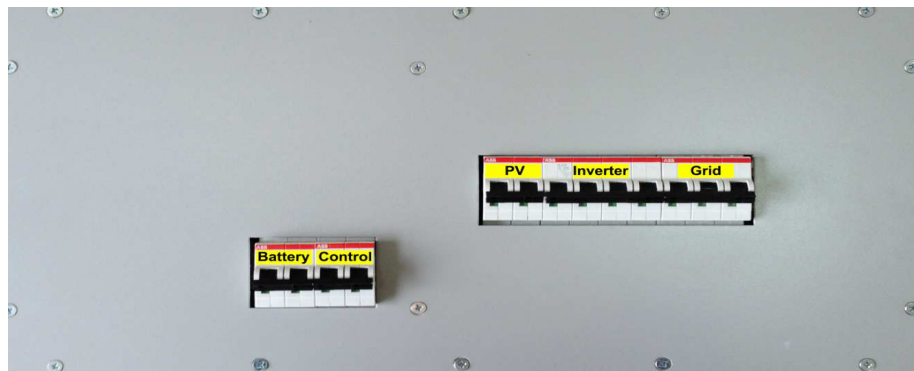


Fig. 2-3 Switches behind center cabinet door

2.3 Working on front lower cabinet door

Method to disassemble lower cabinet door: using a screwdriver, remove the two screws on the upper edge of the lower cabinet door, pull the cabinet door upwards and move it outwards to separate the upper hook of the cabinet door from the fastening screws, as shown in Fig. 2-4 and Fig. 2-5; Loosen the grounding wire inside front lower cabinet door, as shown in Fig. 2-6.



Fig. 2-4 Remove the two screws on the upper edge of the lower cabinet door



Fig. 2-5 Take off lower cabinet door

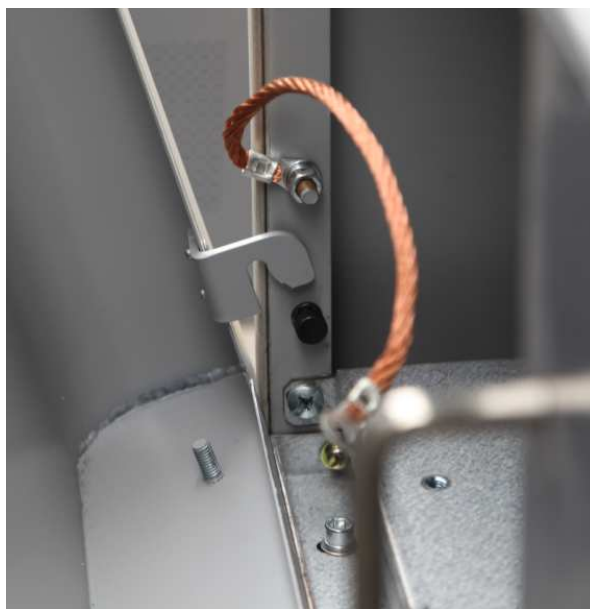


Fig. 2-6 Loosen grounding wire inside lower cabinet door

2.4 Battery installation and hook-up

2.4.1 Battery installation

Disassemble the lower cabinet door of the Phonocube, 6 openings from “0” to “5” for slide-in modules will become accessible as shown in Fig. 2-7; the upper, left opening ‘0’ is for installing the battery management system (hereafter called the BMS and shown as a red box in the diagram). The remaining 5 openings are for the slide-in battery modules. Each slide-in battery module is fixed using three screws as shown in Fig. 2-8.

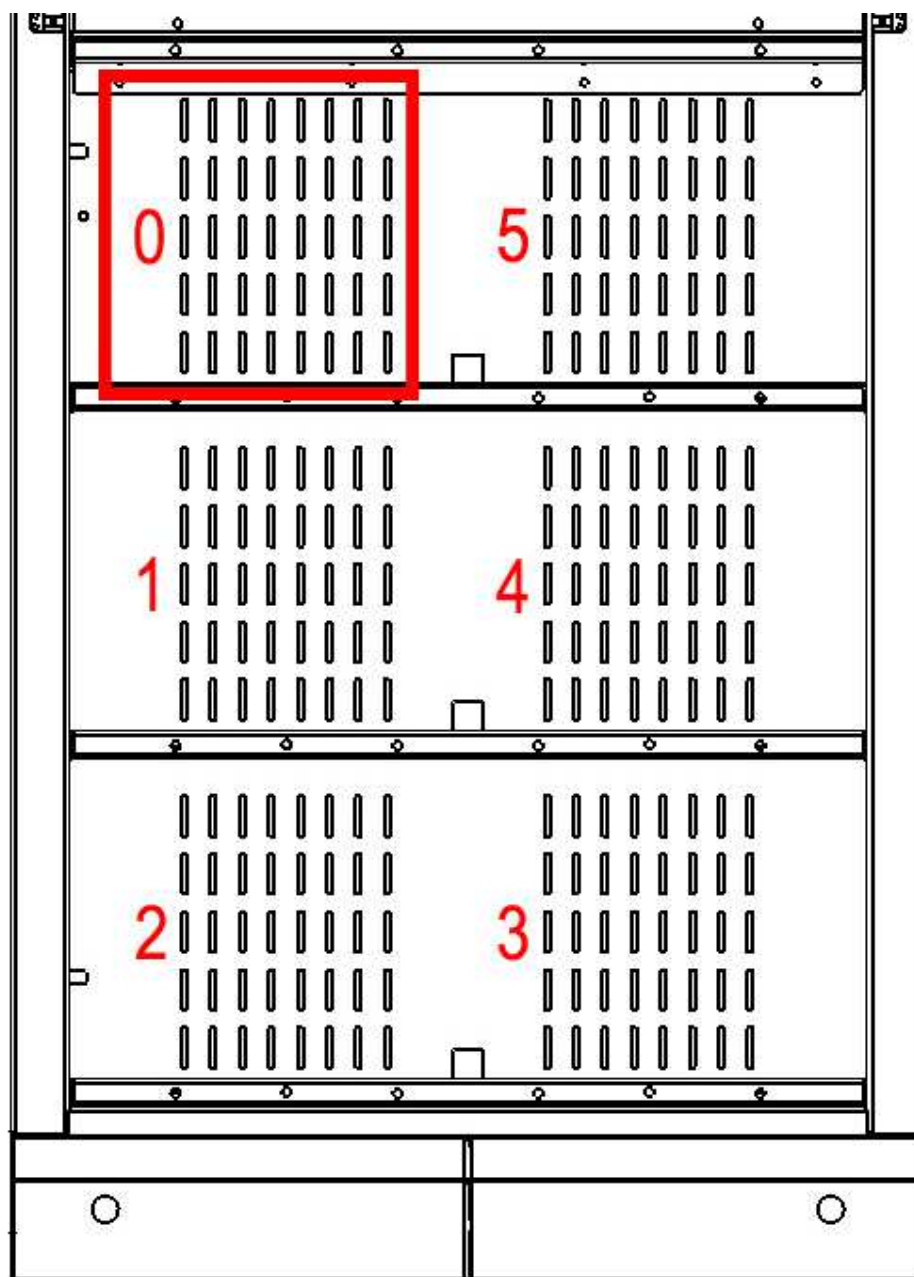


Fig. 2-7 Batteries and BMS location

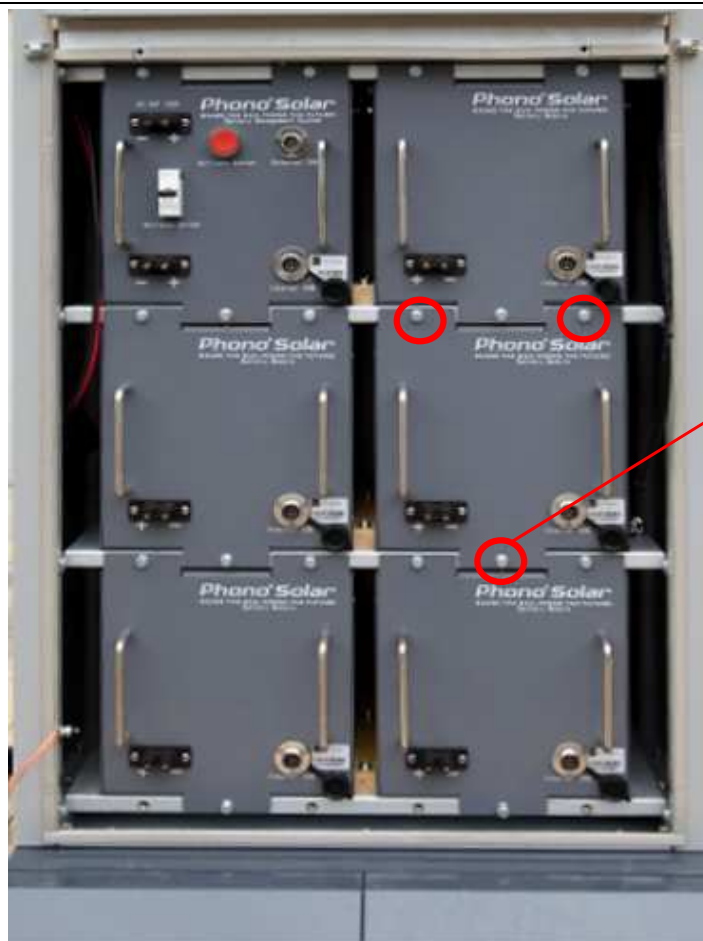


Fig. 2-8 Batteries installation

2.4.2 Hooking-up the batteries

Each battery module have one battery power terminal and one 12-pin module communication terminal (Internal CAN); The BMS module have four terminals on the surface, besides of battery power terminal and communication terminal, there is an external power output terminal (DC OUT 192V) and an external communication terminal (External CAN) to be connected with Phonocube cabinet. Illustrations of the battery module and BMS terminals are shown in Fig. 2-9.



Fig.2-9 The overview of BMS and battery module

Note: The function of the switch and red button on the BMS is for future island mode: When the Phonocube is restarted, if there is no energy from outside (i.e. no energy from PV modules and also no power from the grid) to support the start up of the Phonocube, turn on the switch and press the red button for 20 seconds the energy inside the battery will support the Phonocube start up.

The communication wires are numbered from “0” to “5”. Connect the battery communication wires to the individual battery modules and to the BMS in the correct order with internal CAN holes as shown in Fig. 2-10.



Fig. 2-10 Connect the battery communication wires

The electrical wires are numbered from “0” to “5”. Connect battery electrical wires to the individual battery modules in the correct order and to the BMS as illustrated in Fig. 2-11.

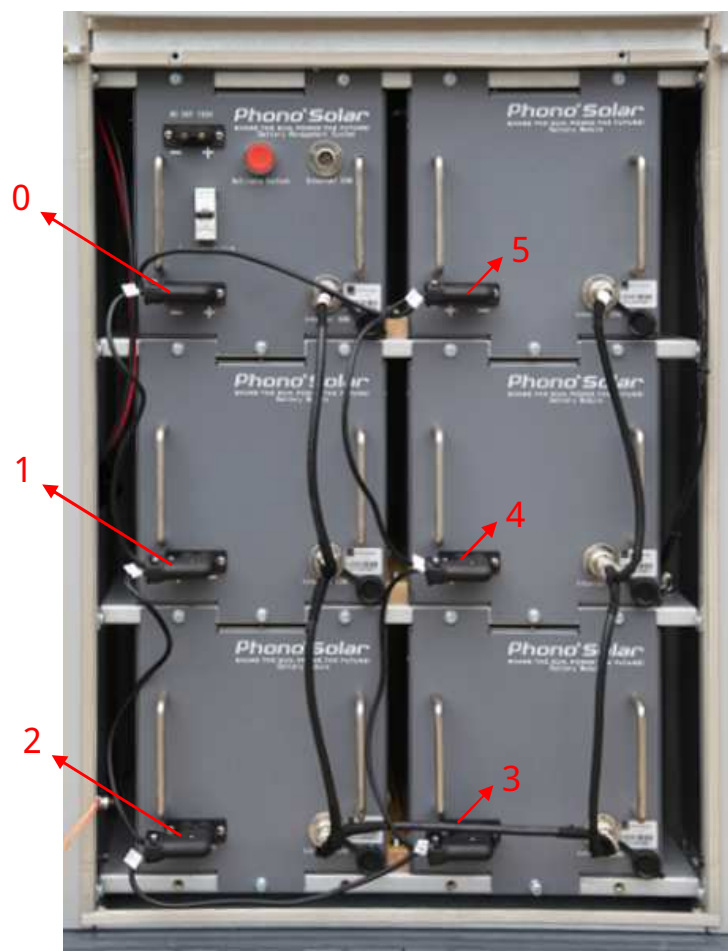


Fig. 2-11 Connect battery electrical wires

Note: After connecting communication wires and battery electrical wires, test the voltage of the total 5 batteries, the value of the voltage should be within the range of 180V to 216V.

Connect the battery communication wire to Phonocube cabinet with external CAN terminal. Connect the electrical wire of the BMS to Phonocube cabinet with DC OUT terminal illustrated in Fig. 2-12.

**Electrical
wire**



**Communication
wire**

Fig. 2-12 Connect the battery communication wire and the electrical wire of the BMS

Note: All communication wires and power wires are equipped with inverse polarity protection; pay close attention to the notch direction during connection and never apply too much force to the terminal plug so as to avoid damaging the pins.

2.5 Working on back center cabinet door

Method to disassemble back center cabinet door: unscrew and loosen the screws around the cabinet door, take off the back center cabinet door with a downward movement, as shown in Fig. 2-13.



Fig. 2-13 overview of back center cabinet door

3 Electrical installation

Note: 1. Touching current carrying parts is strictly prohibited.

2. Before operating the electrical installation, confirm the grid junction box is switched off and all the switches on the front center door are shut down.

3. The maximum DC input Voltage for PV modules must be less than 450V. Before connecting PV modules to the Phonocube, ensure that a professional design has been done has designed the whole PV system.

The method to connect Phonocube to Grid and to home load is showed in Fig. 3-1. Fig. 3-2 is the overview of input and output terminals.

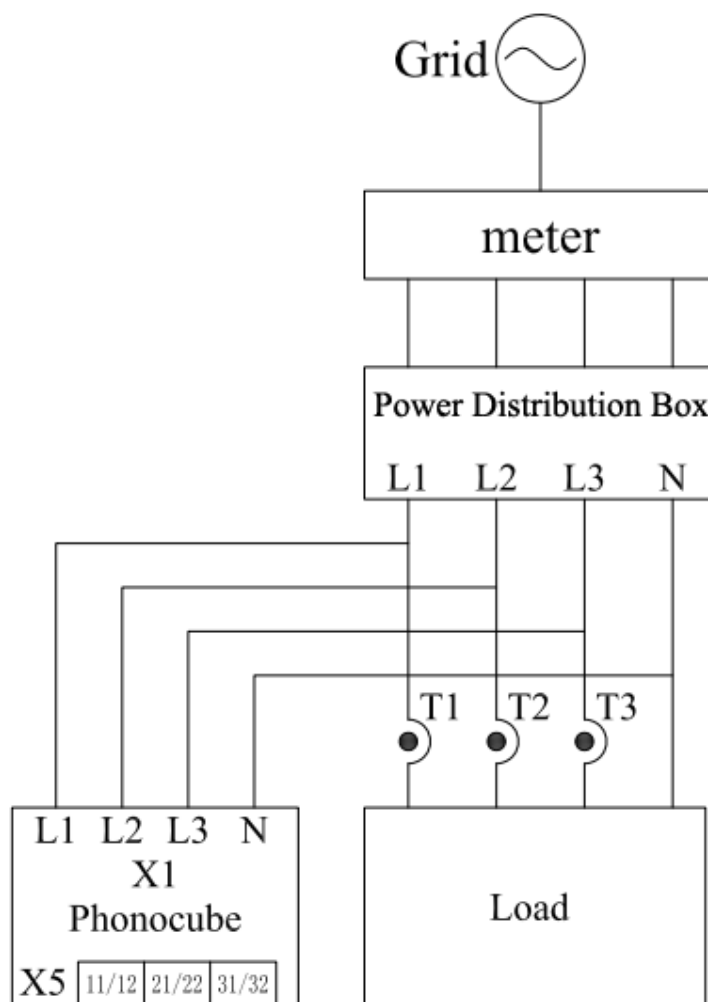


Fig. 3-1 Diagram of connecting Phonocube to Load and to Grid

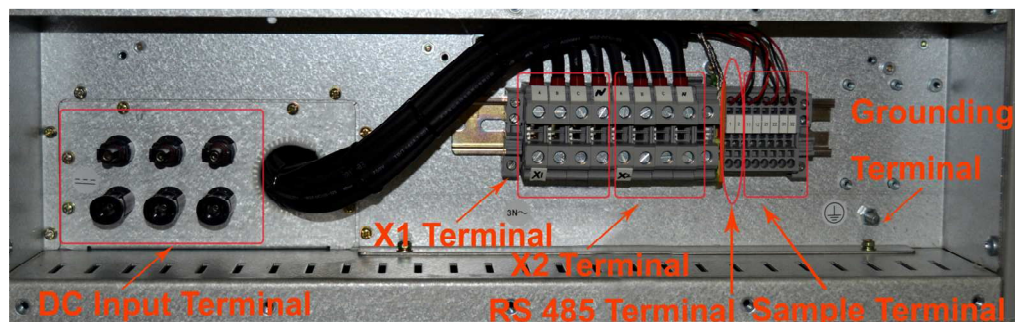


Fig. 3-2 Overview of input and output terminals

3.1 Grounding cables with a 10mm² cross-section must be connected with the Phonocube grounding terminal to the back lower cabinet door.

3.2 The Phonocube must be connected with the grid and loads in parallel. Thus shunting down the Phonocube will not effect the running of loads.

3.3 Single Phonocube installation:

Connect L1, L2, L3 and N in X1 terminals to Three-load bus in the grid junction box with 4x10mm² cross-section cables in the following order: phase A, phase B, phase C and phase N as shown in Fig. 3-3.

Note: After connecting Phonocube to grid, check L1, L2, L3 connecting phase A, phase B, phase C in right order. For example, the voltage between L1 and phase A should be 0V; the voltage between L2/L3 and phase A should be 400V.

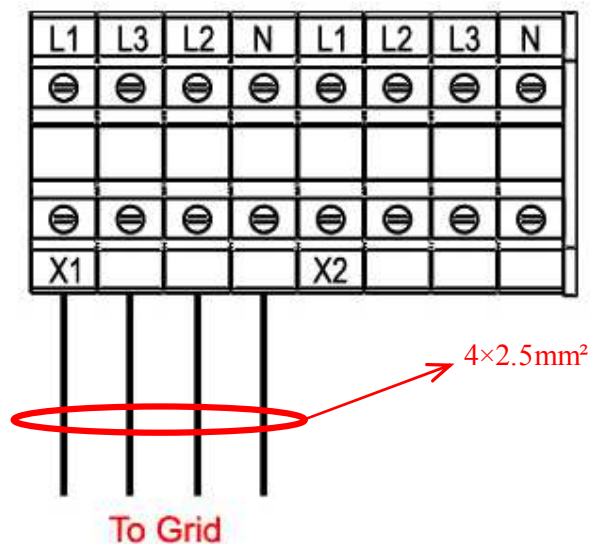


Fig. 3-3 Connect X1 terminals to Grid

3.4 Phonocube has the function of dynamic power tracking for each load phase with the help of

3 current senses. Install 3 current senses A, B and C to three-load bus of Load phase A, phase B and Phase C on the grid junction box. There are six signal holes identified of 11,12,21,22,31,32 on the current sense terminal at back of Phonocube. Connect terminals of current sense A to signal hole 11 and 12, connect terminals of current sense B to signal hole 21 and 22, connect terminals of current sense C to signal hole 31 and 32; 11,21 and 31 should be connected with positive poles of current sense; 12,22 and 32 should be connected with negative poles of current sense. Connecting current senses to load phase as shown in Fig. 3-4, Fig. 3-5 and Fig. 3-6.

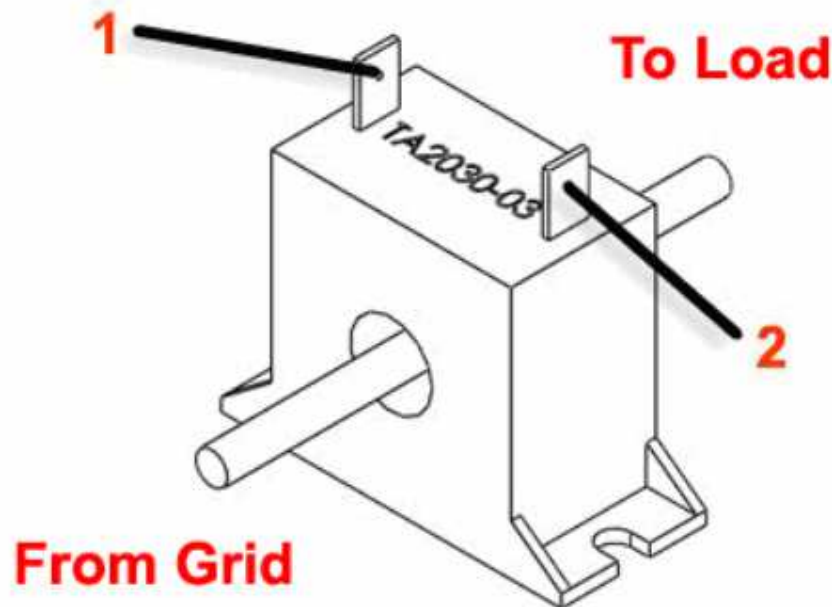


Fig. 3-4 Connect current sense to Load phase, terminal 1 is “+” end, terminal 2 is “-” end

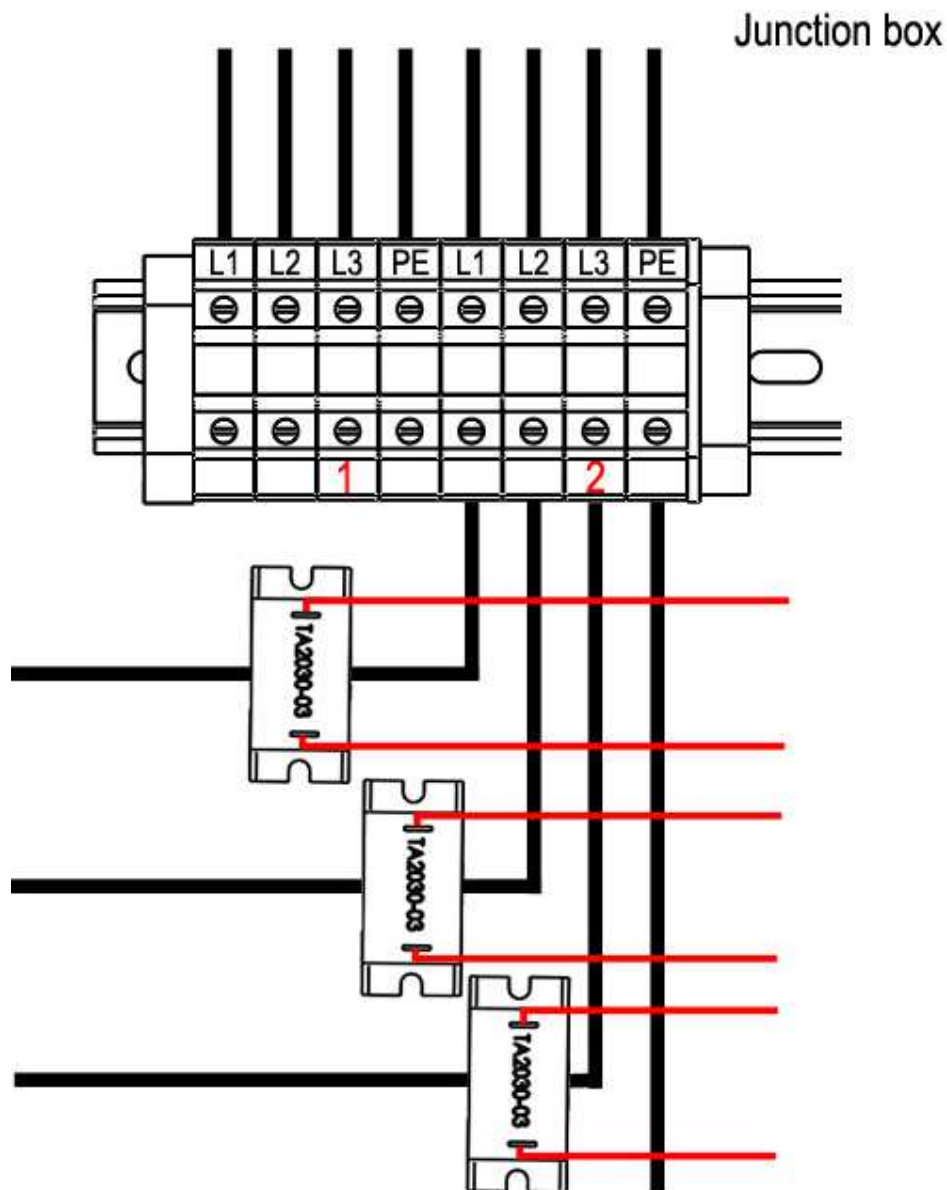


Fig. 3-5 Connect 3 current senses to each load phase

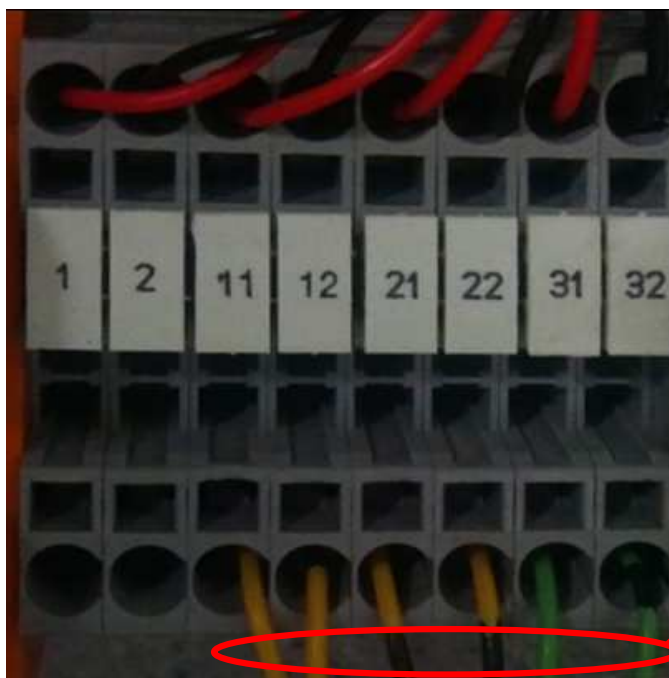


Fig. 3-6 Connect terminals of current sense to Phonocube

3.5 Connect the RS485 terminals with remote monitoring system.

4. Start up

Note: Before starting up the Phonocube, make sure that all the terminals and electrical wires are well connected.

1. Switch on the grid junction box after all the terminals and electrical wires are well connected
2. The method to start up the Phonocube: Turn on all the switches on the front center door in order by "Controller", "Grid", "Inverter", "PV", "Battery", as shown in Fig. 4-1,



Fig. 4-1 Operate switched as orders to start up Phonocube

3. After all the switches are turned on, the Phonocube will operate self-testing and start up within 1 minute. The Phonocube has monitoring functions - detailed information will be displayed on the screen.

4. Re-attach the front and back doors after confirming the Phonocube is running well. Do not forget to connect the grounding wires to the front and back doors.

In the event of error information showing on the LCD screen, please refer to the “**Phono Solar Phonocube Error List**” to find possible reasons and recommended solutions

5. Shut down

The control on the screen is used to shut down the Phonocube.

The method to shut down the Phonocube: From the main interface, choose “**Power Off**” on the LCD screen, and then turn off all the switches on the front center door in order by “**Battery**”, “**PV**”, “**Inverter**”, “**Grid**”, “**Controller**”.

6. Phonocube updating

Phono Solar provides Phonocube program upgrading for debug or new functions, please download Phonocube upgrading tools and updating program on www.phonosolar.com.

7. Technical data

DC Input	
Max. Input Voltage	450Vdc
Max. Input Current	3×10A
Max. DC Input Power	6kW
MPPT Range	80Vdc~320Vdc
Number of PV Inputs	3
MPPT Tracker	1
MPPT Efficiency	99.8%

AC output		
	phonocube7.2	phonocube6.6
Rated Output Power	7.2kW	6.6kW
Max Output Capacity	7.2kVA	6.6kVA
Rated Capacity Each Phase	2.4kVA	2.2kVA
Rated Voltage	400Vac	
Rated Frequency	50Hz	
Frequency Range	47.5~50.2Hz	
Harmonic	≤1%	
Power Factor	0.9 over-excited~0.9 under-excited	
Output	3 phases	
Feed-in	3 phases	

Battery		
Type	Lithium Iron Phosphate	
Rated Voltage	192Vdc	154Vdc
Storage capacity	9.6kWh	7.68kWh
Life Cycles	>6000	

System	
Efficiency of Inverter	94.5%(with transformer)
Efficiency of Total System	90%
Isolated Type	High Frequency Isolation

Working Temperature	0~45
Storage temperature	-10~+35
Cooling	Natural Cooling
Relative Humidity	0~85%
Protection Type	IP20
Display	LCD
Communication Interfaces	RS485, Ethernet
Dimensions (H x W x D)	1800 x 630 x 550 (mm)
Housing	Steel
Weight	220kg (phonocube 7.2) 198kg (phonocube 6.6)
Certification	EN 50178, IEC62133 IEC/EN 62109-1.IEC/EN 62109-2 IEC/EN61000-6-1/-2/-3/-4 VDE-AR-N 4105 VDE0126-1-1+A1

Display and communication

Parameter description	Reference value
Display	LCD panel
Communication mode	RS485 Ethernet

8. DISCLAIMER OF LIABILITY

Since it is impossible for PHONO SOLAR to control installation, operation, application and maintenance of the Phonocube according to this instruction, PHONO SOLAR does not accept responsibility and expressly disclaims liability for any loss, damage, or expense arising out of or in any way connected with such installation, operation, use or maintenance. PHONO SOLAR will not take any responsibilities for any possible violation of patent rights and third party rights that are related to application of the solar energy system. No permission of patents is given through implication. The information of this instruction is from knowledge and experiences of PHONO

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